A noninvasive evaluation of hepatic function of cirrhotic recipients before liver transplantation by using dynamic MR imaging

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Introduction

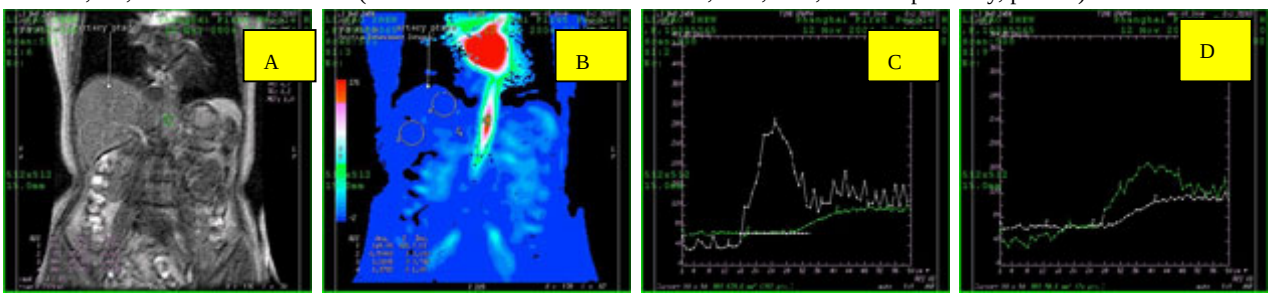
Several studies have proved that MR perfusion imaging can evaluate the micro-blood supply of liver (1-2). Our purpose was to analyze the correlation of hepatic function relating laboratory results with hepatic perfusion index (HPI) got by using a dynamic MRI technique, and find out if MR imaging can help to evaluate the hepatic function of adult cirrhosis recipients before liver transplantation no invasively.

Materials and Methods

98 normal adults and 52 pre-liver transplantation recipients with cirrhotic liver underwent MR imaging. For dynamic MR imaging, 120 consecutive slices were acquired using a coronal two section 2D FSPGR sequence at 1.5T (6/1.5/ 60º, 1.0-sec/acquisition) after bolus injection of 15-mL Gd-DTPA at 5-mL/sec followed by 20-mL normal saline using a power injector, and a breath navigator is used to minimum breath motion. Their row data were transferred to an on-line workstation for post-processing and were classified to two groups (group I: normal, group II: cirrhosis). Temporal enhancement of the aorta, portal vein, and liver parenchyma was assessed through a region-of-interest (ROI) analysis. Artery and portal vein phase is divided by analyzing the time-intensity curves of abdominal aorta and portal vein, and then positive enhancement integrals (PEI) of each patient's right and left hepatic parenchyma were calculated separately in both phases. Hepatic perfusion indexes [HPI= artery PEI / (artery PEI + portal vein PEI) ×100%] of the two lobes were calculated and lab results of each recipient were collected. For statistics, t-test and Spearman's correlation were used to determine if there was a statistically significant difference in the HPI values between normal and cirrhotic livers and if the HPI values of group II have correlations with lab results.

Results

All studies were considered technically adequate (Fig. 1). The HPI of right and left hepatic parenchyma are 19.2±4.6%, 19.5.0±5.4% in group I and are 25.3±4.9%, 25.3±5.0% respectively in group II. The HPI difference between group I and II shows statistically significant (t-test, $p<0.01$) in both right and left hepatic lobes. The HPI values of group II have correlation with ALT, AST, GGT, total bilirubin, albumin/globulin ratio, PT, RBC, PLT levels in right lobe (the correlation coefficients are 0.47, 0.49, 0.44, 0.50, -0.46, 0.62, -0.47, -0.53 respectively, $p<0.05$) and have correlation with ALT, total bilirubin, PT, PLT levels in left lobe (the correlation coefficients are 0.49, 0.53, 0.58, -0.49 respectively, $p<0.05$).



Figue1. MR Images and time-intensity curves of a normal adult. A: Original image (2D FSPGR (6/1.5/ 60º, 1.0-sec/acquisition)). ROIs were put on aorta, portal vein and hepatic parenchyma. B: Pseudo-color image of positive enhancement integrate (PEI), PEI values are shown in bottom left. C: time-intensity curves of aorta (curve1) and hepatic parenchyma (curve2) (x-axis: time; y-axis: time-intensity). D: time-intensity curves of portal vein (curve1) and hepatic parenchyma (curve2).

Conclusion

The HPI values got by this dynamic MR imaging and post-processing method have correlation with hepatic function relating lab results, especially the HPI values of the right hepatic lobe. This dynamic MR imaging technique is useful in evaluating the hepatic function of cirrhosis recipients before liver transplantation.

References

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2. Scharf J et al. JMRI 1999; 9: 568-572.